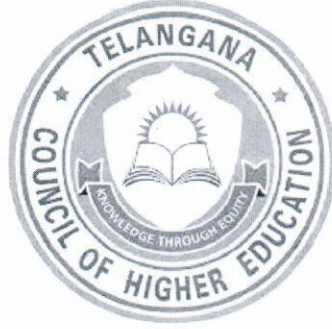


**TELANGANA COUNCIL OF HIGHER EDUCATION
HYDERABAD**



**Scheme of Instructions and syllabus
(Choice Based Credit System)
of
B.Sc. ELECTRONICS**

With effect from: 2025-2026

Final stage of approval with *Amal*
Sub *Dr. Jyoti*
25/8/20

B.Sc. ELECTRONICS SYLLABUS
SCHEME OF INSTRUCTION UNDER CBCS
(w.e.f. from academic year 2025-2026)

Year	Semester	Title of the Paper [Theory and Practical]	Instructions Hrs/week	Number of Credits	Marks		
1st Year	I Sem	Paper - I : Circuit Analysis	4	4	100		
		Practical - I : Circuit Analysis Lab	3	1	25		
	II Sem	Paper - II : Electronic Devices	4	4	100		
		Practical - II : Electronic Devices Lab	3	1	25		
2nd Year	III Sem	Paper - III : Analog Circuits	4	4	100		
		Practical - III : Analog Circuits Lab	3	1	25		
	IV Sem	Paper - IV : Linear Integrated circuits and Analog Modulation	4	4	100		
		Practical - IV : Linear Integrated Circuits and Analog modulation Lab	3	1	25		
		3rd Year	V Sem	Paper – V : Digital Electronics	4	4	100
				Practical -V : Digital Electronics Lab	3	1	25
Elective-I: SEC-1	2			2	50		
Elective-II: SEC-2	2			2	50		
Multidisciplinary course	4			4	100		
Value Added Course (VAC)	3			3	75		
VI Sem (DSE)	Paper – VI: Electronic Communication Systems	4	4	100			
	Practical : Paper – VI : Electronic Communication Systems Lab	3	1	25			
	Elective-III: SEC-3	2	2	50			
	Elective-IV: SEC-4	2	2	50			
	Value Added Course (VAC)	3	3	75			
Project		4	100				
Total Credits : 52							

Multi Disciplinary Courses (MDC-1):

1) Semester-V- Digital System Design using VHDL

Skill Enhancement Courses (SEC):

- 1) SEC-1-Semester-V- Communications Skills/Professional Development Skills/ Entrepreneurship & Starts up
- 2) SEC-2 - Semester-VI- Professional Development Skills /Communications Skills/Entrepreneurship & Starts up
- 3) SEC-3 - Semester-V-Fundamentals of AI Tools/Ability Skills (Competitive Mathematics)
- 4) SEC-4 - Semester-VI- Basic Instrumentation Skills

Value Added Course (VAC) :

- 1) VAC-1-Semester-V-Paper-1: Environmental Science (EVS)/ Cyber Security & Cyber laws
- 2) VAC-2-Semester-VI-Paper-2: Cyber Security & Cyber laws/Environmental Science (EVS)

Project work /Internship:

Semester-VI- Project work /Internship

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B.Sc. ELECTRONICS SYLLABUS
B.Sc. I YEAR
Semester – I

DSC- Paper –I : Circuit Analysis

Total number of hours: 60
No of hours per week:4
Credits:4

UNIT -I

AC Fundamentals: The sine wave –average and RMS values – The J Operator –Polar and Rectangular forms of complex numbers – Phasor diagram-Complex impedance and admittance.

Kirchhoff's Current and Voltage Laws: Concept of Voltage and current sources-KVL and KCL-application to simple circuits (AC and DC) consisting of resistors and sources – Node voltage analysis and Mesh analysis.

UNIT-II

Network Theorems (DC and AC): Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Milliman's Theorem, Application to simple Networks.

UNIT-III

RC and RL Circuits: Transient Response of RL and RC Circuits with step input, Time constants. Frequency response of RC and RL circuits, Types of filters – Low pass filter and High pass filter-frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance: RLC Series and parallel resonance circuits –Resonant frequency –Q Factor- Bandwidth-Selectivity.

Cathode Ray Oscilloscope: Cathode Ray Tube (CRT) and its working, electron gun focusing, deflection sensitivity, florescent screen. Measurement of Time period, Frequency, Phase and amplitude.

Reference Books:

- 1) Basic Electronics-Bernard Grob10th edition (TMH)
- 2) Circuit Analysis-P.Gnanasivam Pearson Education
- 3) Circuit and Networks-A. Sudhakar& S. Pallri (TMH)
- 4) Pulse, digital & switching waveforms-Milliman & Taub.
- 5) Networks, Lines and Fields-John Ryder (PHI)
- 6) Network theory-Smarajit Ghosh (PHI)

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B.Sc. I Year, Semester – I : Electronics Practical

Paper – I : Circuit Analysis Lab

No. of hours per week : 3

1. Measurement of peak voltage, frequency using CRO.
2. Measurement of phase using CRO.
3. Thevenin's theorem and Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR circuit – Frequency response - (Low pass and High pass)
6. CR and LR circuits – Differentiation and integration – tracing of waveforms.
7. LCR – Series resonance circuit – frequency response – Determination of f_0 , Q and band width.
8. Simulation: i) verification of KVL and KCL.
ii) study of network theorems.
iii) study of frequency response (LR).

Note: Student has to perform minimum of Six experiments.

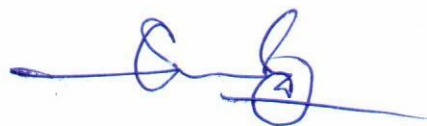
Reference Books:

- 1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
- 2) Basic Electronics – A Text Lab Manual – Zbar, Malvino, Miller.

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B.Sc. ELECTRONICS SYLLABUS
B.Sc. I YEAR
Semester - II
DSC- Paper –II : Electronic Devices

Total number of hours : 60
No of hours per week: 4
Credits :4

UNIT-I

PN Junction: Formation of PN junction, Depletion region, Junction capacitance, Diode equation (no derivation) Effect of temperature on reverse saturation current, V-I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor(BJT) : PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output), Early effect, CB, CC, CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h-parameter model and its equivalent circuit. Determination of h – parameters from the characteristics, Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

UNIT-III

Field Effect Transistor (FET): Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as Voltage variable resistor. Advantages of FET over BJT.

MOSFET: Construction and working of enhancement and depletion modes, output and transfer characteristics Application of MOSFET as a switch.

Uni Junction Transistor (UJT): Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

UNIT-IV

Silicon Controlled Rectifier (SCR): Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.

Photo electronic Devices: Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode (LED).

Reference Books:

- 1) Electronic Devices and circuits-Millman and Halkias,(TMH)
- 2) Principles of Electronics-V.K.Mehta & Rohit Mehta
- 3) Electronic Devices and Circuits-Allen Moltershed (PHI)
- 4) Basic Electronics and Linear Circuits-Bharghava U
- 5) Electronic Devices and Circuits-Y.N.Bapat
- 6) Electronic Devices and Circuits-Mithal.
- 7) Experiments in Electronics-S.V.Subramanyam.

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Paper – II : Electronic Devices Lab

1. To draw volt- ampere characteristics of Junction diode and determine the cut – in voltage, forward and reverse resistances.
2. Zener diode V – I Characteristics – Determination of Zener breakdown voltage.
3. Voltage regulator (line and load) using Zener diode.
4. BJT input and output characteristics (CE configuration) and determination of ‘h’ parameters.
5. FET – Characteristics and determination of FET parameters.
6. UJT characteristics – determination of intrinsic standoff ratio.
7. UJT as relaxation oscillator.
8. Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

Reference Books:

- 1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell - PHI

Lab manual for Electronic Devices and Circuits - 4 Edition. By David M. ...

B.Sc. ELECTRONICS SYLLABUS

B.Sc. II YEAR

Semester - III

DSC- Paper - III : Analog Circuits

Total number of hours : 60

No of hours per week: 4

Credits :4

UNIT – I

Rectifiers and filters: Rectifiers– half wave, full wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output, Filters – choke input (inductor) filter, Shunt capacitor filter, L section and π section filters.

UNIT – II

Regulated Power Supplies: Block diagram of regulated power supply, Transistor Voltage Regulators – series and shunt type, three terminal IC regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS). UPS –Principle and working.

UNIT – III

Transistor amplifier: Classification of amplifiers, Hybrid π model of a transistor, Single stage RC coupled amplifier – frequency response and analysis.

Feedback in amplifiers: Positive and negative feedback, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower, Darlington pair and its advantages

UNIT – IV

Oscillators: Barkhausen criterion for sustained oscillations, RC oscillators- RC phase shift and Wien's bridge oscillators, LC oscillators- Hartley and Colpitt.

Multi-vibrators: Astable, Mono stable and Bi-stable multi-vibrators (Qualitative treatment only)

Reference Books:

1. Electronic Devices and Circuits-Millman and Halkias (TMH)
2. Basic Electronics and linear circuits - Bhargava, Kulshreshta & Gupta TMH
3. A first course in Electronics-AA Khan and KK Dey-PHI
4. Electronic Devices and Circuit Theory-Robert L Boylestad& Louis Nashelsky
5. Pulse, Digital and Switching circuits by Milliman and Taub

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B.Sc. II YEAR, Semester – III : Electronics Practical

Paper - III: Analog Circuits Lab

No. of hours per week : 3

1. Study of HWR, FWR and bridge rectifier, determination of ripple factor.
2. Series inductor, shunt capacitor, L-section and π -section filters; determination of ripple factor using Full wave Rectifier.
3. Study of voltage regulator using IC's - 78XX & 79XX.
4. Colpitt's oscillator – determination of frequency.
5. RC Phase shift oscillator- determination of frequency
6. Astable multi-vibrator – determination of time period and duty cycle.

Simulation experiments:

- i) Rectifiers
- ii) RC coupled amplifier
- iii) Wein bridge oscillator
- iv) Colpitt's oscillator
- v) RC phase shift oscillator
- vi) Astable multi-vibrator

Note: Student has to perform minimum of Six experiments

Reference Books:

- 1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
- 2) Basic Electronics – A Text Lab Manual – Zbar, Malvino, Miller.

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B.Sc. ELECTRONICS SYLLABUS

B.Sc. II YEAR, Semester - IV

DSC- Paper - IV: Linear Integrated Circuits and Analog Modulation

Total number of hours : 60

No of hours per week: 4

Credits :4

UNIT - I

Operational Amplifiers: Emitter Coupled Differential amplifier, Block diagram of Op.amp. Characteristics of Op.amp, Op.amp parameters-Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, offset voltages, Input bias current, Basic Op-Amp circuits-Inverting Op-Amp, Non-inverting Op-Amp, Op Amp as: Summing amplifier, subtractor, Comparator, Voltage follower, Integrator, and Differentiator and : logarithmic amplifier

UNIT - II

Applications of Op-Amps: Sine wave [Wien Bridge] generator and square wave [Astable] generator, Triangular wave generator, Mono stable multi-vibrator, IC 555 Timer [Block diagram and its working], IC 555 as mono stable and astable multi-vibrators.

UNIT - III

Modulation: Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation.

Amplitude modulation: Analysis of Amplitude modulation, side bands, modulation index, AM modulator, balanced modulator, Demodulation – diode detector.

UNIT - IV

Frequency modulation: Analysis of FM, Working of simple frequency modulator, - detection of FM waves – FM Discriminator. Advantages of frequency modulation. AM and FM Transmitters and radio receivers [block diagram approach]. Introduction to PAM, PPM, PWM, and PCM, Delta modulation.

Reference Books:

1. Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI
2. Linear Integrated Circuits- D Roy Choudhury and Shail B Jain
3. Electronic Communication Systems-George Kennedy & Bernard Davis
4. Principles of Electronic Communication Systems-Louis E Freznel, TMH

Pranav Jaiswal, Asst. Prof. in ECE

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Total number of hours per week: 3

1. Op amp as inverting Amplifier- determination of gain (with AC and DC).
2. Op amp as non- inverting Amplifier- determination of gain (with AC and DC).
3. OP Amp as Summing amplifier and comparator(Zero crossing detector)
4. Astable multi-vibrator – determination of time period and duty cycle.
5. Mono stable multi-vibrator- determination of gate width.
6. Integrator/ Differentiator – study of wave forms.
7. Astable multi-vibrator using IC 555
8. Mono stable multi-vibrator using IC 555.
9. AM modulator and detector
10. FM modulator and detector

1. Inverting and Non-inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein bridge oscillator
4. Astable multi-vibrator using Op Amp
5. Astable multi-vibrator using IC 555

Reference Books:

- 1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
- 2) Basic Electronics – A Text Lab Manual – Zbar, Malvino, Miller.

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B.Sc. ELECTRONICS SYLLABUS

B.Sc. III YEAR, Semester - V

Paper - V: Digital Electronics

Total number of hours : 60

No of hours per week: 4

Credits :4

UNIT-I

Number system and Logic gates: Conversions of Binary, octal, Decimal & hexadecimal number systems, Binary addition and subtraction (1's and 2's complement methods).

Logic gates- OR, AND, NOT, XOR, NAND, NOR gates and their Truth tables – Design of basic gates using the Universal gates- NAND and NOR gates, Half adder, Full adder and parallel adder logic circuits. Logic families and their characteristics – TTL, CMOS and ECL logic circuits.

UNIT-II

Boolean algebra and Combinational logic circuits: Boolean algebra- Laws and identities, DeMorgan's Theorems. Simplification of Boolean expressions using Boolean identities- Reduction of Boolean expressions using Karnaugh Maps - Sum of Products (SOP) representation (up to four variables). Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder (8 to 3).

UNIT-III

Sequential logic circuits: Flip-flops - SR, D, JK, T and Master-Slave JK; Registers - Shift Registers- SISO, SIPO, PISO and PIPO Registers.

Counters: 4-bit Asynchronous (Ripple) counter, Modulo-N counter, synchronous counter. Up/down counters – ripple counter IC7493 - Decade counter IC7490 – working, truth tables and timing diagrams.

UNIT-IV

Introduction to 8085 Microprocessor & its architecture: Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle, Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts – Hardware and Software, Address space partitioning – Memory mapped I/O & I/O mapped I/O.

Instruction set of 8085 microprocessor: Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations. Stack and Subroutines, Addressing modes

Reference Books:

1. Digital Principles and Applications – Malvino & Leach - TMH.
2. Digital Principles and Applications-Ronald J.Tocci— Pearson Education.
3. Text book of Electronics Bsc III year (vol.III)-Telugu Akademi
4. Digital Fundamentals – F.Loyd & Jain – Pearson Education.
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
6. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
7. Digital Electronics - Gothman

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B.Sc. ELECTRONICS SYLLABUS
B.Sc. III YEAR , Semester – V Practical
Paper –V : Digital Electronics Lab

No. of hour per week :3

- Verification of truth tables of AND, OR, NOT, NAND, NOR, EXOR Gates using IC 74XX series.
- Construction of basic gates using NAND and NOR gates.
- Construction of Half Adder using gates. Verification of truth table.
- Construction of Full Adder using gates and verification of truth table.
- Verification of truth tables of flip flops: RS, D, and JK using IC's.
- Construction of binary counters 7493

Simulation experiments:

1. 4bit parallel adder using Full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Up/down counter using 74193
5. Multiplexer/De-Multiplexer.
6. Encoder.

Note: Student has to perform minimum of Six experiments

Reference Books:

1. Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2. Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

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B.Sc. ELECTRONICS SYLLABUS
B.Sc. III YEAR, Semester - VI
Paper – VI
ELECTRONIC COMMUNICATION SYSTEMS

Total number of hours : 45

No of hours per week: 3

Credits :4

Unit – I:

Introduction: Need and Necessity of Digitalization, Advantages of Digital communication, Elements of Digital Communication.

Signal analysis: Complex Fourier Spectrum, Fourier transform, Properties of Fourier transform - Random signals and noise, Correlation and Power spectrum

Information Theory: Introduction, Information Entropy, Properties of Entropy, Information rate, Types of information Sources, Channels, Types of Channels, Joint entropy, Conditional entropy, Redundancy, Mutual information, Channel capacity.

Unit- II:

Digital Communication Systems: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Amplitude (PPM), Pulse Code Modulation (PCM), Delta modulation, Adaptive delta modulation, Quantization and Noise consideration

Digital Transmission and Reception: Timing, base band systems, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift Keying (PSK), Quadrature Amplitude Modulation (QAM).

Unit - III:

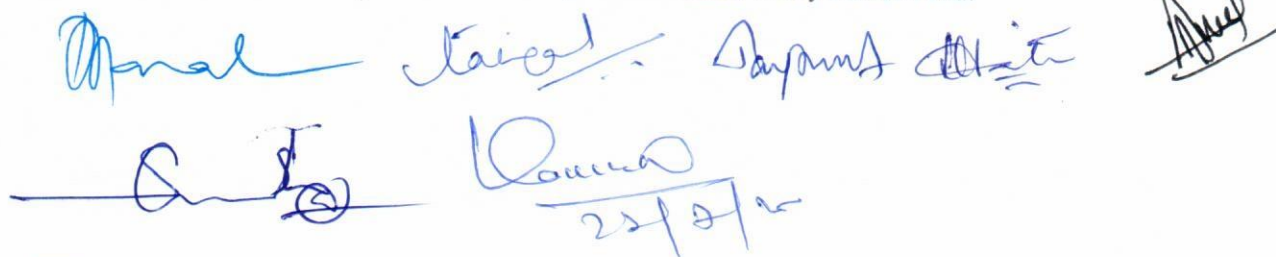
Error detection and coding: Parity check, CRC, Hamming distance, Hamming codes, cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes.

Unit -IV:

Case studies: cellular concepts, global positioning (GPS), Facsimile, Video text, Wifi, Bluetooth, IOT, Cognitive radio.

Reference Books:

1. Analog and Digital Communication – Simon Haykin, John Wiley, 2005
2. Electronics Communication System-Fundamental through Advanced-Wayne Tomasi, 5th Edition, PHI, 2009.
3. Principles of Communication Systems – Herbert TAub, Donald L Schiling, Goutam Ssha, 3rd Edition, Mcgraw-Hill, 2008.
4. Electronic Communications – Dennis Roddy and John Coolean, 4th Edition, PEA, 2004
5. Electronics & Communication System – George Kennedy and Bernard Davis, TMH, 2004.
6. Analog and Digital Communication – K.Sam Shanmugam, Wiley, 2005
7. John G. Proakis, "Digital Communication", 4th Edition, Tata McGraw-Hill publishing company Limited, New Delhi, 2003.
8. P Ramakrishna Rao, "Digital Communication", Tata McGraw-Hill Education Private Limited, New Delhi, 2011.
9. Analog and Digital Communication Systems – M.S. Roden, 3rd Edition, Prentice Hall of India
10. Modern Digital and Analog Communication Systems-B.P. Lathi.
11. Communication Techniques for digital and Analog signals – M. Kanefsky, John Wiley and Son.
12. Telecommunication – T.H. Brewster, McGraw Hill.
13. Principles of Digital communication, Das Chatterjee and Mallic, Wiley Eastern Ltd.


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B.Sc. ELECTRONICS SYLLABUS
B.Sc. III YEAR, Semester – VI Practical

DSE - Paper – VI : ELECTRONIC COMMUNICATION SYSTEMS
Lab

No. of hours per week :3

I Experiments in Internetworking:

1. Pulse Amplitude Modulation
2. Pulse Code Modulation
3. Pulse Width Modulation
4. Pulse Phase Modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Delta modulation
8. Phase shift Keying

II Experiments in Data Communication.

- 1) Study of serial communication.
- 2) Study of wireless communications.
- 3) Study of parallel communication.

Practical *Internal* *Report* *Mark* *_____*

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(SKILL ENHANCEMENT COURSE-IV)

BASIC INSTRUMENTATION SKILLS

(Credits: 02)

This course is to get exposure with various aspects of instruments and their usage through hands-on-mode. Experiments listed below are to be in communication of the topics

UNIT : I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.

Multimeter: Principles of measurement dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Blockdiagram ac millivoltmeter, specifications and their significance.

Cathode Ray Oscilloscope: Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only- no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition, Time base operation, synchronization, front panel controls. Specification of a CRO and their significance. Use of CRO for the measurement of voltage dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage

Oscilloscope: Blockdiagram and principle of working.

UNIT : II

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators. Pulse generator, and function generator. Brief idea for testing specifications. Distortion factor meter, wave analysis.

Impedance Bridges & Q-Meters: Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time- base stability, accuracy and resolution.

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Circuit tracing of Laboratory electronic equipment.
4. Use of Digital multimeter/VTV M for measuring voltages.
5. Circuit tracing of Laboratory electronic equipment.
6. Winding a coil / transformer.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges

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Question paper pattern

Faculty of Science
Electronics

Title of the paper:
Paper:

Duration: 3Hrs]

[Max. Marks : 80

Section-A: Short Answer Questions Answer any EIGHT questions

(8 x 4 = 32)

1. Unit – I
2. Unit – I
3. Unit – I (Problem)
4. Unit – II
5. Unit – II
6. Unit – II (Problem)
7. Unit – III
8. Unit – III
9. Unit – III (Problem)
10. Unit – IV
11. Unit – IV
12. Unit – IV (Problem)

Section B: Essay Answer Questions

(4 x 12 = 48)

- 13 (a) Unit – I
OR
(b) Unit – I
- 14 (a) Unit – II
OR
(b) Unit – II
- 15 (a) Unit – III
OR
(b) Unit – III
- 16 (a) Unit – IV
OR
(b) Unit – IV

Practical *Project* *Assignment* *Unit* *Final*
22/2/25